



Joanna Young, Girls on Ice Alaska

AK CSC

ALASKA CLIMATE SCIENCE CENTER

ANNUAL REPORT 2012-2013

A MESSAGE FROM THE ALASKA CLIMATE SCIENCE CENTER DIRECTORS:

For the Alaska Climate Science Center (AK CSC), 2013 was a busy year marked by continued growth and further development of our research capacity and outreach activities.

In this 2012-2013 annual highlights issue for the AK CSC, you will learn about continued efforts to train early career scientists to meet the growing needs of our stakeholders and the challenges and opportunities posed by a changing climate system in Alaska. All of these early career scientists are addressing challenging issues related to climate variability and impacts on natural resource management, and once again you will meet one of the AK CSC funded graduate students.

In addition, this issue provides updates on the AK CSC outreach efforts at both the secondary and post-secondary levels—highlighting innovative programs to encourage the next generation of scientists and decision makers. We hope you enjoy learning about the AK CSC and we encourage you to visit our new and improved websites or contact us directly to learn more about our research, education, and outreach activities. ♦



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HIGHLIGHTS:

- Juneau workshop identifies research and management needs in the icefield to ocean system
- Five new student research projects funded with the UAF Center for Global Change
- Symposium discusses issues and research in northern hydrology
- Girls on Ice Alaska has successful second season on Alaska's Gulkana Glacier
- New Alaska Climate Science Center website launched
- Over 20 new peer-reviewed publications

Browse additional news and updates from
the Alaska Climate Science Center at:

CSC.ALASKA.EDU
DOI.GOV/CSC/ALASKA

▲ Pictured above: Participants of GOI Alaska hike up the Gulkana Glacier. Many of the program's research and educational activities rely on and build on decades of USGS research on this glacier.

FEATURED RESEARCH: JUNEAU GLACIER WORKSHOP

In March 2013, 34 scientists and land and resource managers spent two days at the US Forest Service Mendenhall Glacier Visitor Center in Juneau, Alaska discussing changes in the Gulf of Alaska (GoA) watershed. Watersheds along the Gulf of Alaska are experiencing some of the highest rates of glacier melting on Earth. These changes could cause significant societal and ecological impacts on the structure and productivity of marine ecosystems, safety hazards related to glaciers, hydropower generation, and sea-level rise.

The workshop began with several presentations that covered the state of the science from various components of the glacier system, including glacier change, hydrology, ocean interactions, biology, and biogeochemistry. Interdisciplinary working groups spent the afternoons discussing system interactions, information deficits, and resource management implications. The workshop participants identified several research priorities, and new collaborations were forged across disciplines to study glacier change and its impacts on related systems and processes.

The workshop agenda, presentations, and related publications are online: csc.alaska.edu/events/juneau-glacier-workshop

Beyond being a fruitful workshop for the participants themselves, the workshop produced several valuable outcomes. The

workshop concluded with two public presentations in Juneau. In addition, a public fact sheet about the "Icefield to Ocean" system is forthcoming and will be widely distributed in the spring of 2014. An interdisciplinary team of conference attendees is presently working on a synthesis paper for peer-review. ♦



▲ Juneau Glacier Workshop participants spent two days at the Mendenhall Glacier Visitor Center discussing the regionally and globally important icefield to ocean system. ♦

CENTER FOR GLOBAL CHANGE STUDENT RESEARCH GRANTS AWARDED

The Center for Global Change and Arctic System Research (CGC)(www.cgc.uaf.edu) at the University of Alaska Fairbanks was established in 1990 to develop, coordinate, and implement interdisciplinary research and education in global change. For more than 20 years, the CGC has hosted an annual student research grant competition. In May 2012, CGC awarded five student research grants in conjunction with the AK CSC.

Meet the recipients:



Jen Curl is helping to develop the protocols for a seabird monitoring program in Kenai Fjords National Park. Curl's project will aid in the detection of seabird population trends through time—an important first step in identifying population responses to environmental variability and change.



Jenny Davis is investigating the connection between glacier runoff and absolute runoff in the Valdez Glacier watershed by comparing modeled glacier discharge from Valdez Glacier to measured discharge in Valdez Glacier Stream. Davis' study will improve our understanding of the contributions of glaciers to global sea level rise in a changing climate.



Rebecca Finger is studying the interactions between thawing discontinuous permafrost and the shift from spruce forest to wetland and lake ecosystems in Alaska. Finger is doing this by monitoring changes in soil conditions, plant growth, and nutrient cycles to gain a better understanding of the possible effects of climate change.



Dana Fjare is studying the ways that carbon interacts with nitrogen and phosphorus to affect nutrients in streams. By adding nutrients to streams in the Caribou-Poker Creeks Watershed, Dana is manipulating nutrient ratios and using different sources of organic carbon to represent the bioavailable and recalcitrant carbon pools in streams.



Chas Jones is integrating local knowledge into scientific models to estimate the amounts of driftwood harvested by a village in rural Alaska. He is also calculating the amount of time and money that one community invested to secure alternative fuel sources. Jones is also studying the ways that permafrost degradation influences groundwater springs and the ability of rivers in Interior Alaska to freeze up. ♦



▲ Participants of the Northern Research Basins Conference and Workshop represented 32 delegates from six countries.

NORTHERN RESEARCH BASINS SYMPOSIUM HELD IN ALASKA

The 19th annual Northern Research Basins Symposium and Workshop “*Water Resources: Developments in a Changing Environment*” was held from August 11-17, 2013 in Southcentral Alaska. The symposium included 32 delegates from the US, Canada, Norway, Russian Federation, Denmark, and Finland. The delegates represented government, private industry, and academia. Eleven of the delegates were graduate students, which gave the conference a dynamic blend of energetic up and coming researchers and internationally recognized experts in northern hydrology.

Crossing a wide variety of hydrological disciplines, the symposium included 30 oral presentations and two poster sessions. Activities, including a boat ride up the Susitna River and other discussion time gave participants ample opportunities for lively conversations about snow, permafrost hydrology, hydropower, ecology, and remote sensing. Task forces reported on the status of solid precipitation measurements and runoff prediction, and a new task force was formed to further investigate cold regions science for societal needs.

In addition to the AK CSC, the University of Alaska Fairbanks (UAF), the UAF Institute of Northern Engineering, and the International Arctic Science Committee (IASC) supported the symposium.

The full agenda, participant list, and more information is available on the symposium website at: www.19thnrb.com. ♦

“I really enjoyed reconnecting and sharing ideas with a number of colleagues I have known for years. It was also really nice to meet the next generation of northern hydrologists.”

• Bob Bolton, NRB Organizing Committee



FEATURED STUDENT: RICK LADER

Rick Lader is an atmospheric sciences student at the University of Alaska Fairbanks. Originally from New York, Rick has always wanted to live in the Arctic. His AK CSC research project, with advisor Uma Bhatt, brings together his interest in the Arctic as well as his undergraduate degrees in meteorology and communication. Rick describes his work as being, “really data intensive, but also geared towards application.”

Stakeholders across Alaska are interested in modeled temperature and precipitation data for planning and management needs, but there is a limited understanding of which models perform the best in Alaska for these variables. In his work, Rick is comparing reanalysis models—or models that simulate the past—with historic weather station data for eight locations across Alaska. This comparison will be used to identify and rank the models that are most accurate for specific variables or seasons of the year.

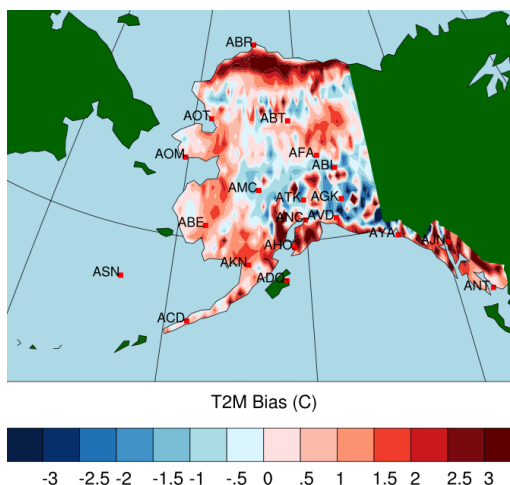
Being able to accurately model the past is necessary for modeling the future. Models of temperature and precipitation are used to force other models used to study permafrost, hydrology, wildfire, and other natural systems. Rick’s work will help identify the best temperature and precipitation reanalysis models so that the input data for other models can be improved.

“If you’re going to simulate the future climate, you have to be able to simulate the past well.”

Rick describes how stakeholders “want to be able to take the data and use it”, but a challenge for users is identifying inconsistencies that decrease the quality of the model outputs. While conducting his research, Rick identified several aspects of the input data that affect the model outputs. His thesis will include several case studies to explain these problems.

Rick says his research has been fun because in the process of going over the data he has learned a lot of fun facts about Alaska climate and the extremes. He plans to defend his thesis and graduate in the spring of 2014. ♦

MERRA T2M Bias, July, 1979-2009



◀ Mean July 2-meter temperature (°C) bias of the Modern Era Retrospective Analysis for Research and Applications (MERRA) relative to the validation data set for 1979-2009. Red colors indicate that the model has a warm bias. Blue colors indicate that the model has a cold bias.



◀ Participants of GOI Alaska carefully approach a crevasse on the Gulkana Glacier. During the 12 day program, girls carry out several research projects on the ice.

GIRLS ON ICE ALASKA PROGRAM CONTINUES TO GROW

With support from the AK CSC, Girls on Ice Alaska (GOI Alaska) recently completed their second year of programming on Alaska's Gulkana Glacier. Nine girls from across Alaska, Washington, and Yukon participated in the 12-day program co-led and co-instructed by University of Alaska Fairbanks graduate students, Joanna Young, Marijke Habermann, and Barbara Trüessell.

GOI Alaska, which is modeled after the successful GOI program in Washington state, is a tuition-free science, mountaineering, camping, and art instruction program for high school girls. The program provides a unique educational wilderness adventure to girls who may not otherwise have such an opportunity, and it is not uncommon for participants to describe the experience as transformative. One participant shared, "I'm quiet and reserved so having to open up to eight other girls and four instructors was out of my comfort zone. My self-confidence increased from this experience. I know I can finish what I start and emotionally and physically I feel a lot better about myself."

"It's been useful for my own science as well. I have learned a lot that I wouldn't have learned otherwise."

• Joanna Young

What few people realize about the program, however, is how profoundly it impacts the women who run it. Program co-leader Joanna Young described how she "had this wonderful sense that the program was going to be really rewarding for the girls, and they would walk away from it feeling stronger and having more confidence in their science and critical decision-making skills...", but she didn't count on how much it would benefit her and the other instructors.

The women coordinated all aspects of GOI Alaska, and it has given them many valuable experiences. They developed curriculum and learned a lot about communicating science. They have also written proposals, coordinated dozens of volunteers, and organized the expedition logistics. Joanna describes how these experiences have, "been really helpful, because they are the same skills you need to design a safe field expedition." Young also described putting many of these skills to work now in her own research projects and how the program has provided her with an incredible professional development opportunity. ♦

NEW AK CSC WEBSITE

The Alaska Climate Science Center has a new website! The new website complements the Department of Interior site (doi.gov/csc/Alaska) with several additional features, including:

- Space to promote events and news,
- Detailed listings of projects, including project descriptions, related publications, and researcher information, and
- A resource library to easily share reports, websites, videos, white papers, posters, presentations, fact sheets, and more!

Display your project and work!

Each AK CSC researcher or affiliated project personnel will be set up with a login for the website. Use your login to update your biography, project information, and add resources.

Promote your events!

Are you hosting an event or giving a presentation? Did you have a new paper published or were you covered in the media? Please forward this information to us so that we can share it on the website, Facebook, and Twitter.

Please e-mail questions or information to share on the website to Kristin Timm, Science Communications Lead at kmtimm@alaska.edu. ♦

Over 20 new peer-reviewed publications were produced by AK CSC researchers in 2013! Read the list at: csc.alaska.edu/news/2013-publications-ak-csc-researchers

For more information, visit the AK CSC online at:
<http://csc.alaska.edu> or
www.doi.gov/csc/alaska



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